Interpreting the Management Process in IEEE/EIA 12207 with the Help of "PMBOK®"

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Objectives

- Explain the Management process in IEEE/EIA 12207:
  - What it says
  - What it doesn't say.
- Show that the Project Management Institute's Guide to the Project Management Body of Knowledge (PMBOK® Guide) provides detailed clarification of the Management process:
  - Introduce the PMBOK Guide
  - Explain the nine Knowledge Areas in the PMBOK
  - Explain the five project management Process Groups, and map them to the activities of the Management process.
- Raise your level of interest in the PMBOK Guide.

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Topics

- Management Life Cycle Process
- Guide to the Project Management Body of Knowledge (PMBOK Guide)
- What an IEEE/EIA 12207 User Gains from PMBOK Guide
- What a PMBOK Guide User Gains from IEEE/EIA 12207 for Software-Related Projects
- Wrap-up

IEEE/EIA 12207 is the Industry Implementation of ISO/IEC 12207: 1995

- Describes 17 processes that define the software life cycle (from initial concept, through requirements analysis, design, coding, testing, installation, operation, maintenance, and retirement).
- Defines a technical dialect of English, that's suitable for international trade in software products and services.
- Presents the software life cycle as a combination of labor and work products that result from one or more 2-party "contracts."
- Defines a tailoring process that
  - adapts each of the 17 life cycle processes in the standard to the unique circumstances of a "contract" by identifying which elements of the process (activities, tasks) must be performed
  - adds necessary activities and tasks to the "contract" that do not appear in the standard.
- Adds to the contents of ISO/IEC 12207: 1995: (1) guidance about life cycle data, and (2) guidance about implementation.

Key IEEE/EIA 12207 Terms

IEEE/EIA 12207 defines 37 terms explicitly, plus others:

- Contract - A binding agreement between two parties (could be a legal contract, or could be a simple e-mail message or something else).
- Life cycle model - A framework containing the processes, activities, and tasks involved in the development, operation, and maintenance of a software product, spanning the life of a system from the definition of its requirements to the termination of its use.
- Party - An organization (or part of an organization) that enters into a contract.
- Process - A set of interrelated activities, which transform inputs into outputs.
- Requirement - Not defined in IEEE/EIA 12207

  A useful definition: (1) A characteristic that a system, software product, or software service must possess in order to be acceptable to the acquirer; (2) A “requirement” of the standard; or (3) an obligation imposed by a contract. (based on MIL-STD-498, (3.30))

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Requirement of IEEE/EIA 12207

A requirement (of IEEE/EIA 12207) is a declaration in clauses 5, 6, or 7, or in Annex A, F, G, H, or J of IEEE/EIA 12207.0, or in clauses 4, 5, or 6 of IEEE/EIA 12207.1,...

that contains ‘shall’ or ‘will.’

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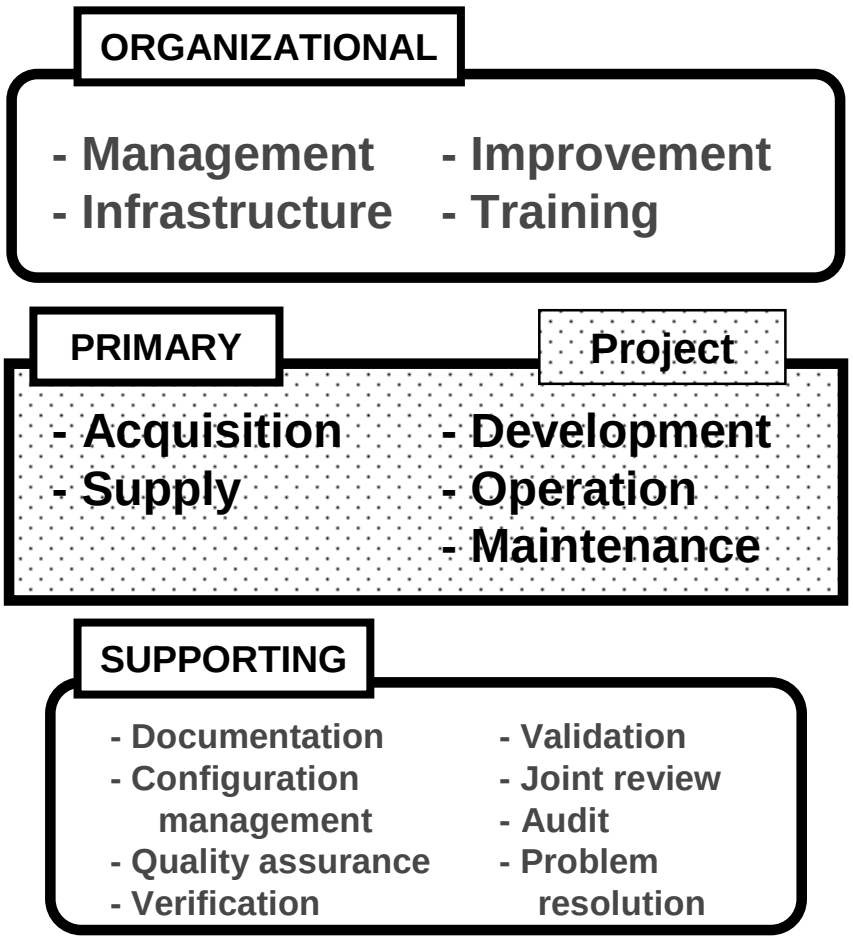
Parties & Projects

- Parties enter into contracts with one another. The contracts incorporate applicable ‘shall’ requirements of the standard, to make them obligatory on the supplier.
- An acquirer party can choose to declare its purpose or intent by identifying applicable ‘will’ requirements of the standard (that then apply to it).
- Parties carry out their software activities by means of projects.
- Projects are temporary in nature.
- IEEE/EIA 12207 (and ISO/IEC 12207: 1995) describe five different kinds of projects.

IEEE/EIA 12207's Life Cycle Processes



Employed by an organization, typically "outside the realm of specific projects and contracts..." Describes what, "should be in place prior to performing the [primary] process(es)."

Defines what an acquirer, supplier, developer, operator, or maintainer project does during the software life cycle.

Employed and executed, as needed, by another process. Supports the other process as an integral part with a distinct purpose. The responsibility* of the organization performing the other process.

*Responsibility for a process means ensuring that it is in existence and functional

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Management (Clause 7.1)

- Management process activities:
  - Initiation and Scope Definition
  - Planning
  - Execution and Control
  - Review and Evaluation
  - Closure.

- Initiation and Scope Definition (2 requirements):
  - Establishes the requirements of the process to be managed
  - Establishes the feasibility of the process to be managed
  - May modify the requirements of the process to be managed.

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Management (cont'd)

- Planning (3 requirements):
  - Prepares plans for the process to be managed
  - Plans include descriptions of activities and tasks, and identify software products
  - Descriptions include schedules for tasks, estimation of effort, identification of needed resources, allocation of tasks, and more.

- Execution and Control (5 requirements):
  - Begins implementing the plans for the process to be managed, while exercising control over the process
  - Monitors execution of the process, and provides reports
  - Investigates and resolves problems,
  - Documents the problems and their resolution
  - Reports the progress of the process to be managed.

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Management (cont'd)

- Review and Evaluation (2 requirements):
  - Ensures that software products and plans are evaluated against requirements
  - Assesses the results of the evaluations (against objectives for the process, and completion of the plans).

- Closure (3 requirements):
  - Determines whether the process to be managed is complete
  - Checks results and records of software products, activities and tasks for completeness
  - Archives the results and records suitably (as specified in the contract).

IEEE/EIA 12207 Guidance About Work Products of Management

- Management Process Plan (required)
  - Sample guidance about the preparation and content of this plan can be found in IEEE Std. 1058.1-1987 “IEEE Standard for Software Project Management Plans”
  - Additional guidance about content can be found in IEEE/EIA 12207.1, (5.2).
- Policy Record - line of responsibility to be described
  - Sample guidance about the content of this record can be found in IEEE/EIA 12207.1, (5.4), and in ISO 9001:1994 and ISO 9000-3: 1997.
- Problem Analysis Report (required)*
  - Sample guidance about the content of this report can be found in IEEE/EIA 12207.1, (5.5).

*This work product of clause 7.1.3.3 was not recorded in IEEE/EIA 12207.1. However, it is listed in ISO/IEC TR 15271 Guidebook to ISO/IEC 12207: 1995.

Guidance in IEEE/EIA 12207 About Management Process Activities?

- Nearly none in IEEE/EIA 12207.2:
  - Managers are not required to produce additional management plans that would duplicate other existing plans (page 61)
  - Software measurement categories from Practical Software Measurement (PSM - 1996) may be used in evaluations. (page 62)

- So, if an organization does not understand already how to satisfy the 15 requirements of the five Management process activities, then reading the standard will not help.

- The Management process in IEEE/EIA 12207 (and ISO/IEC 12207: 1995) is written for experienced, skilled managers.

Management in the IEEE/EIA 12207 Software Life Cycle

- Each Primary life cycle process in IEEE/EIA 12207 (in clause 5) is an instantiation of the Management process (7.1) for a different category of project:
  - Acquisition
  - Supply
  - Development
  - Operation
  - Maintenance.

- So, in a software life cycle, Management occurs at both the organization level and the project level.

Acquisition Project Instantiation of Management

management process activity	EXAMPLE TASKS
Initiate	consider options for acquisition define and document acceptance strategy
Plan	prepare acquisition plan document acquisition requirements (e.g., to use an RFP) tailor 12207 (may choose to listen to other parties)
Execute & Control	select supplier enter into contract with supplier (include tailored 12207) monitor supplier
Review & Eval	conduct acceptance testing
Close	accept product or service take responsibility for control of delivered software products

Development Project Instantiation of Management

management process activity	EXAMPLE TASKS
Initiate	select software life cycle model for development activities select and tailor standards, methods, tools, and programming languages that are appropriate for development
Plan	develop plans for doing development
Execute & Control	do or support system requirements analysis and design do software requirements analysis and design do software coding, integration, and testing do or support system integration and qualification testing do software installation document and resolve problems
Review & Eval	evaluate work products, support software acceptance testing
Close	deliver software product or service according to contract

Organization-level Management

- Some management practices often are mandatory for all projects in an organization: for example, personnel, time reporting, finance, contracting, and procurement.
- Additional mandatory practices might include (by Management activity):
  - Initiation and scope definition --

    Business development, bid/no-bid decisions, cost proposals
  - Planning --

    Risk management, cash-flow projections, safety and security plans
  - Execution and control --

    Earned value, internal evaluations, corrective action, status reporting
  - Review and evaluation --

    Audits by customers, acceptance testing support
  - Closure --

    Internal audits, project archives.

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Project-level Management

- Project-level management is well described by the Project Management Institute's Guide to the Project Management Body of Knowledge (PMBOK).*

**A Guide to the Project Management Body of Knowledge (PMBOK® Guide)*, Project Management Institute: Newtown Square, PA, USA, 2000 (www.pmi.org)

- PMBOK describes the management processes that are common across all projects. However, these are processes whose implementation may differ from industry to industry, and project to project.

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Topics

- *Management Life Cycle Process*

- Guide to the Project Management Body of Knowledge (PMBOK® Guide)
- What an IEEE/EIA 12207 User Gains from PMBOK Guide
- What a PMBOK Guide User Gains from IEEE/EIA 12207 for Software-Related Projects
- Wrap-up

PMBOK Guide

- Describes 39 “generally accepted”* processes that define a project’s life cycle (from initial concept through closing).
  *“Generally accepted” means applicable to most projects most of the time, and widely felt to be valuable and useful.
- Defines a management dialect of English, that’s suitable internationally within the project management profession for talking and writing about the profession.
- Should be tailored by the project management team to apply, “only what is appropriate for any given project.”
- Is the recognized authority on what project management is - provides basis or content for:
  - ISO 10006: 1997 Guidelines to Quality in Project Management
  - IEEE Std 1490-1998 Guide to the Project Management Body of Knowledge

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Sample Terms in PMBOK

PMBOK Guide defines 277 terms explicitly, plus others:

- Activity - An element of work of a project. Has an expected duration, an expected cost, and expected resource requirements. Can be subdivided into tasks.
- Contract - A mutually binding agreement that obligates the seller to provide the specified product and obligates the buyer to pay for it. (12.4.3.1. A contract is a legal relationship subject to remedy in the courts.)
- Cost baseline - A time-phased budget that will be used to measure and monitor cost performance on the project. (7.3.3.1)
- Cost variance - Any difference between the budgeted cost of an activity and the actual cost of that activity.
- Earned value - Previously called the budgeted cost of work performed (BCWP) for an activity or group of activities…The physical work accomplished plus the authorized budget for this work.

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Sample Terms (cont'd)

- Formal acceptance - Documentation that the client or sponsor has accepted the product of the project phase, or [accepted] major deliverable(s) …(5.4.3.1)
- Process - A series of steps bringing about a result. (3.1)
- Project - A temporary endeavor undertaken to create a unique product, service, or result.
- Project life cycle - A collection of generally sequential project phases whose name and number are determined by the control needs of the organization or organizations involved in the project.
- Project phase - A collection of logically related project activities, usually culminating in the completion of a major deliverable.
- Project scope - The work that must be done to deliver a product with the specified features and functions.

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Sample Terms (cont'd)

- Requirement - Not defined in PMBOK Guide.
- Reserve - A provision in the project plan to mitigate cost and/or schedule risk.
- Schedule baseline - The approved project schedule…(6.5.1.1).
- Schedule variance - Any difference between the scheduled completion of an activity and the actual completion of that activity.
- Task - …Lowest level of effort on a project...A generic term for work that is not included in the work breakdown structure, but could be a further decomposition of work...
- Work breakdown structure - A deliverable-oriented grouping of project elements that organizes and defines the total work scope of the project.
- Work package - A deliverable at the lowest level of the work breakdown structure, when that deliverable may be assigned to another project manager to plan and execute.

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PMBOK Knowledge Areas

- Project management processes are organized into 9 knowledge areas:
  - Project Integration Management, three processes ensure coordination among project elements,
  - Project Scope Management, five processes ensure that the project does what is required for success, and no more,
  - Project Time Management, five processes ensure that the project completes on time,
  - Project Cost Management, four processes ensure that the project spends no more than its budget,
  - Project Quality Management, three processes ensure that the needs are met that gave rise to the project,

PMBOK Knowledge Areas (cont'd)

- Remaining knowledge areas:
  - Project Human Resource Management, three processes ensure that the project uses its people effectively,
  - Project Communications Management, four processes ensure appropriate management and communication of project information,
  - Project Risk Management, six processes ensure that the project understands and responds to its risks,
  - Project Procurement Management, six processes ensure that the project acquires goods and services properly from outside vendors.

Elements of a Process Description in the PMBOK Guide

- Each project management process description includes:
  - Summary description,
  - List and explanation of inputs,
  - List and explanation of appropriate tools and techniques,
  - List and explanation of outputs.

- Example -- Project Plan Development process in Project Integration Management:
  - Five inputs,
  - Four useful tools and techniques,
  - Two outputs.

Project Plan Development Process

- Inputs:
  - Other planning outputs (from other knowledge areas)
  - Historical information
  - Organizational policies
  - Constraints
  - Assumptions
- Tools and Techniques:
  - Project planning methodology
  - Stakeholder skills and knowledge
  - Project management information system
  - Earned value management
- Outputs:
  - Project plan
  - Supporting detail.

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Process Groups in PMBOK Guide

- A process group is similar to an activity in the Management process of IEEE/EIA 12207.
- A process group collects one or more processes that accomplish one of five elements of project management:
  - Initiating (1 process),
  - Planning (21 processes),
  - Executing (7 processes),
  - Controlling (8 processes),
  - Closing (2 processes).
- Process Groups vs. Knowledge Areas:
  - Orthogonal ways of organizing the 39 project management processes in the PMBOK,
  - Process groups guide management,
  - Knowledge areas guide training.

Process Groups vs. Knowledge Areas

	(1) Initiating	(21) Planning	(7) Executing	(8) Controlling	(2) Closing
Project Integration Management		1	1	1	
Project Scope Management	1	2		2	
Project Time Management		4		1	
Project Cost Management		3		1	
Project Quality Management		1	1	1	
Project Human Resource Management		2	1		
Project Communications Management		1	1	1	1
Project Risk Management		5		1	
Project Procurement Management		2	3		1

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Topics

- *Management Life Cycle Process*
- *Guide to the Project Management Body of Knowledge (PMBOK® Guide)*
- What an IEEE/EIA 12207 User Gains from PMBOK Guide
- What a PMBOK Guide User Gains from IEEE/EIA 12207 for Software-Related Projects
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The PMBOK Guide Explains the Management Process

- Each process group in the PMBOK Guide primarily corresponds to one activity (or a pair of activities) in the Management process in IEEE/EIA 12207:
  - Initiating (PMBOK) corresponds to Initiation and Scope Definition activity (12207),
  - Planning (PMBOK) corresponds to Initiation and Scope Definition activity (12207) and to Planning activity (12207),
  - Executing (PMBOK) and Controlling (PMBOK) correspond jointly to Execution and Control activity (12207) and to Review and Evaluation activity (12207),
  - Closing (PMBOK) corresponds to Closure activity (12207).
- Process groups in the PMBOK Guide are defined in much more detail than the activities in the Management process in IEEE/EIA 12207.

Explaining Management

- Initiation and Scope Definition (2 requirements):
  - Establishes the requirements of the process to be managed
  - Establishes the feasibility of the process to be managed

- Sample clarifying topics in PMBOK Guide:
  - Sample Inputs: Product description, strategic plan, project selection criteria, historical information,
  - Sample Tools & Techniques: Project selection methods, expert judgment,product analysis, benefit/cost analysis, alternatives identification,
  - Sample Outputs: Project charter, project manager assigned, constraints, assumptions, scope statement, supporting detail, scope management plan.

Explaining Management (cont'd)

- Planning (3 requirements):
  - Prepares plans for the process to be managed
  - Plans include descriptions of activities and tasks, and identify software products
  - Descriptions include schedules for tasks, estimation of effort, identification of needed resources, allocation of tasks, and more.
- 21 PMBOK processes are related to Planning, including:
  - Project Plan Development
  - Scope Planning
  - Scope Definition
  - Activity Definition
  - Activity Sequencing
  - Activity Duration Estimating
  - Schedule Development
  - Resource Planning
  - Cost Estimating
  - Cost Budgeting
  - Quality Planning
  - Organizational Planning
  - Staff Acquisition
  - Communications Planning
  - Risk Management Planning
  - Risk Identification
  - Qualitative Risk Analysis
  - Quantitative Risk Analysis

Explaining Management (cont'd)

- Sample topics in PMBOK Guide that clarify Planning:
  - Sample Inputs: Product description, project charter, constraints, assumptions, scope statement,
  - Sample Tools & Techniques: Project planning methodology, project management information system, earned value management, product analysis, benefit/cost analysis, alternatives identification, expert judgment, decomposition, templates, analogous estimating, mathematical analysis, duration compression, simulation, resource leveling heuristics, coding structure, parametric modeling, bottom-up estimating, cost budgeting tools, benchmarking, cost of quality, human resource practices, negotiations, stakeholder analysis, risk probability and impact, interviewing, sensitivity analysis, decision tree analysis, make-or-buy analysis, contract type selection,
  - Sample Outputs: Project plan, work breakdown structure, project schedule, cost baseline, organizational policies, product documentation, scope statement, operational definitions, checklists, risk management plan.

Explaining Management (cont'd)

Jointly

- Execution and Control (5 requirements):
  - Begins implementing the plans for the process to be managed, while exercising control over the process
  - Monitors execution of the process, and provides reports
  - Investigates and resolves problems,
  - Documents the problems and their resolution
  - Reports the progress of the process to be managed.
- Review and Evaluation (2 requirements):
  - Ensures that software products and plans are evaluated against requirements
  - Assesses the results of the evaluations (against objectives for the process, and completion of the plans).

Explaining Management (cont'd)

- Sample clarifying topics in PMBOK Guide:
  - Sample Inputs: Project plan, work breakdown structure, project schedule, cost baseline, organizational policies, product documentation, scope statement, operational definitions, checklists, risk management plan,
  - Sample Tools & Techniques: Work authorization system, project management information system, earned value analysis, variance analysis, organizational procedures, status review meetings, inspection, performance measurement, quality audits, control charts, Pareto diagrams, flowcharting, trend analysis, change control systems, training, reward and recognition systems, team-building activities, information distribution methods,
  - Sample Outputs: Work results, completed checklists, formal acceptance, corrective action, process adjustments, performance reports, project plan updates, contract documentation, adjusted baseline, product documentation, project records, project presentations.

Explaining Management (cont'd)

- Closure (3 requirements):
  - Determines whether the process to be managed is complete
  - Checks results and records of software products, activities and tasks for completeness
  - Archives the results and records suitably (as specified in the contract).

- Sample clarifying topics in PMBOK Guide:
  - Sample Inputs: Contract documentation, performance reports, product documentation, other project records,
  - Sample Tools & Techniques: Procurement audits, performance reporting tools and techniques, project reports, project presentations,
  - Sample Outputs: Contract file, formal acceptance and closure, project archives, project closure, lessons learned.

The PMBOK Guide Also Explains the Primary Processes

- Each primary life cycle process in IEEE/EIA 12207 instantiates the Management process in IEEE/EIA 12207.
- So, the PMBOK Guide clarifies each of the primary life cycle processes also.
- Each primary life cycle process describes how a different category of project in the software life cycle is managed. There are a total of five categories:
  - Acquisition
  - Supply
  - Development
  - Operation
  - Maintenance.

Explaining Acquisition Projects

- Tasks related to *Initiation and Scope Definition*:
  - Consider options for acquisition
  - Define and document acceptance strategy.

- Sample clarifying topics in PMBOK Guide:
  - Sample Inputs: Product description, strategic plan, project selection criteria, historical information,
  - Sample Tools & Techniques: Project selection methods, expert judgment,product analysis, benefit/cost analysis, alternatives identification,
  - Sample Outputs: Project charter, project manager assigned, constraints, assumptions, scope statement, supporting detail, scope management plan.

Explaining Development Projects

- Requirements related to *Initiation and Scope Definition*:
  - Select software life cycle model for development activities
  - Select and tailor standards, methods, tools, and programming languages that are appropriate for development.

- Sample clarifying topics in PMBOK Guide:
  - Sample Inputs: Product description, strategic plan, project selection criteria, historical information,
  - Sample Tools & Techniques: Project selection methods, expert judgment,product analysis, benefit/cost analysis, alternatives identification,
  - Sample Outputs: Project charter, project manager assigned, constraints, assumptions, scope statement, supporting detail, scope management plan.

Exercises

Example: Using the clarification of the Initiation and Scope Definition activity in the Management process on slide 32 above, slides 39 and 40 clarified tasks in the Acquisition process and Development process (on slides 15 and 16 above) that were related to the Initiation and Scope Definition activity.

- Exercise 1: Using the content of slides 33 through 37 above, clarify the remaining tasks in the Acquisition process and Development process on slides 15 and 16 that are related to the remaining activities of the Management process
  - Planning
  - Execution and Control
  - Review and Evaluation
  - Closure.
- Exercise 2 (extra credit for advanced students): Clarify all tasks in the three remaining primary processes (Supply, Operation, Maintenance) in the same way as in the Example and Exercise 1.

ISO/IEC TR 16326: 1999

- *ISO/IEC TR 16326: 1999 Guide for the Application of ISO/IEC 12207 to Project Management*:
  - applies the Management process in ISO/IEC 12207: 1995 (which is identical to the Management process in IEEE/EIA 12207) to managing software projects,
  - provides guidance for software project management,
  - uses the 1996 PMBOK Guide and *ISO 10006: 1997 Guidelines to quality in project management* as the main bases for recommended software project management practices (ISO 10006 itself, "adopted the process approach," and key content of most of the knowledge areas of the 1996 PMBOK Guide).
- ISO/IEC TR 16326 is a presentation of project management practices that are useful primarily in the Development and Maintenance processes of IEEE/EIA 12207. The report is less useful for understanding the Acquisition, Supply or Operation processes.

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What an Application Area Extension of the PMBOK Guide Is

- Application area extensions reflect:
  - Aspects of a project environment that are unusual or unique that project managers must understand to manage their project well,
  - Ways to improve the efficiency or effectiveness of a project in such an environment, ways based on common knowledge and common practices.
- An application area extension is thought to be necessary when:
  - there are generally accepted knowledge and practices for a category of projects in one application area, and
  - those knowledge and practices are not generally accepted across the full range of project types in most application areas.

IEEE/EIA 12207 Supplements the PMBOK Guide

- The primary life cycle processes of IEEE/EIA 12207 are five very simple “de facto” application area extensions for the following categories of software life cycle projects:
  - Acquisition
  - Supply
  - Development
  - Operation
  - Maintenance.
- Their activities and tasks are generally accepted (and practiced by managers) for achieving the goals of such projects, and they are specialized to such projects.
- The IEEE/EIA 12207 processes were developed by a standard-setting process as rigorous at that used for the PMBOK Guide.

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The Value of IEEE/EIA 12207

- There are no official application area extensions of the PMBOK Guide for software...
  - Acquisition
  - Supply
  - Development
  - Operation
  - Maintenance.
- No such projects have been chartered yet.
- IEEE/EIA 12207 primary life cycle processes are interim substitutes, “de facto.”

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- *What an IEEE/EIA 12207 User Gains from PMBOK Guide*
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Obtaining IEEE/EIA 12207

- Order from IEEE
  - Contact IEEE at 800-678-4333 (732-981-0060 outside the US and Canada) -- FAX: 908-981-9667 -- telex 833233

    (for other sources, see http://standards.ieee.org/faqs/order.html#Q1)

- Even DoD personnel and contractors must order from IEEE now. The standard can no longer be ordered from the Document Automation and Production Service in Philadelphia, PA.

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Obtaining PMBOK Guide

- PMBOK 2000
  - Order from Project Management Institute (PMI)

    Over the phone: 412-741-6206 (follow directions)

    Online: http://www.pmi.org/publictn/pmboktoc.htm (choose paperback, hardcover, or CD-ROM)

For those who have an IEEE standards license...

- PMBOK 1996 (*has fewer Risk Management processes than PMBOK 2000*)
  - IEEE Std 1490-1998 Adoption of PMI Guide to PMBOK

Obtaining ISO Standards

- Order from ANSI (USA) or ISO
  - ANSI:

    Over the phone: 212-642-4900 (follow directions)

    Online: http://webstore.ansi.org/ansidocstore/find.asp? (search for publication by number or name, when found click on title, follow directions)

  - ISO: Online:

    http://www.iso.org/iso/en/prods-services/catalogue/intstandards/Standards_Search.StandardsQueryForm

    (set “Search scope” to “Both”, search for publication by ISO number, committee or keyword, when found click on title, follow directions).

Resources

- *Guidebook to IEEE/EIA 12207*, by Lewis Gray (Abelia: Fairfax, VA, 2000)
- *ANSI/ISO/ASQ Q10006-1997 Quality management -- Guidelines to quality in project management* (ASQ: Milwaukee, WI, 1997)
- *ISO/IEC TR 15271 Information Technology -- Guide for ISO/IEC 12207 (Software Life Cycle Processes)* (ISO/IEC: Geneva, 1998)
- *ISO/IEC TR 16326 Software engineering -- Guide for the application of ISO/IEC 12207 to project management* (ISO/IEC: Geneva, 1999)

Download More Information

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Acronyms

ANSI	American National Standards Institute (www.ansi.org)
ASQ	American Society for Quality (www.asq.org)
DoD	Department of Defense (USA) (www.defenselink.mil)
EIA	Electronic Industries Alliance (www.eia.org)
IEC	International Electrotechnical Commission (www.iec.ch)
IEEE	Institute of Electrical and Electronics Engineers (www.ieee.org)
ISO	International Organization for Standardization (www.iso.org/iso/en/ISOOnline.frontpage)
PMBOK	Project Management Body of Knowledge
PMI	Project Management Institute (www.pmi.org)
PMP	Project Management Professional (credential awarded by the Project Management Institute)
RFP	Request for Proposal
TR	Technical Report